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(71) Applicant(s)

Turner Intellectual Property Limited

(Incorporated in the United Kingdom)

Wetmore Road, BURTON-ON-TRENT, Staffs,
DE14 1SD, United Kingdom

(72) Inventor(s)

Paul Steabben Hapworth

(74) Agent and/or Address for Service

Marks & Clerk

Alpha Tower, Suffolk Street Queensway,
BIRMINGHAM, B1 1TT, United Kingdom

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(56) Documents Cited

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(58) Field of Search

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INT CL⁶ B24B, B27B

(54) Cutting apparatus with guides

(57) Apparatus for cutting tiles comprising a base (29, 30), a gap in the base through which a cutting wheel (26) projects, and a guide fence (35) linearly slidably adjustable over the base. The guide fence (35) has clamps (54, 55) at its opposite ends for snap-fit quick engagement and release with a body (10) of the apparatus, and has slots (71, 72) in its upper surface for the releasable engagement of tags (69, 70) at the lower end of a mitre guide (66) which provides a flat surface (68) at an angle to the base (29, 30) for producing a mitre cut for a tile received on said surface (68) and fed at said angle onto the cutting wheel.

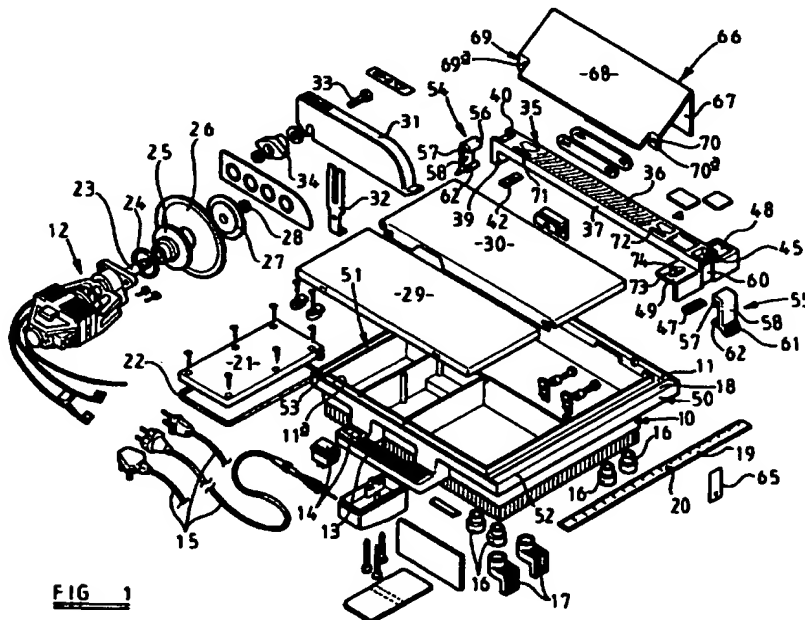


FIG 1

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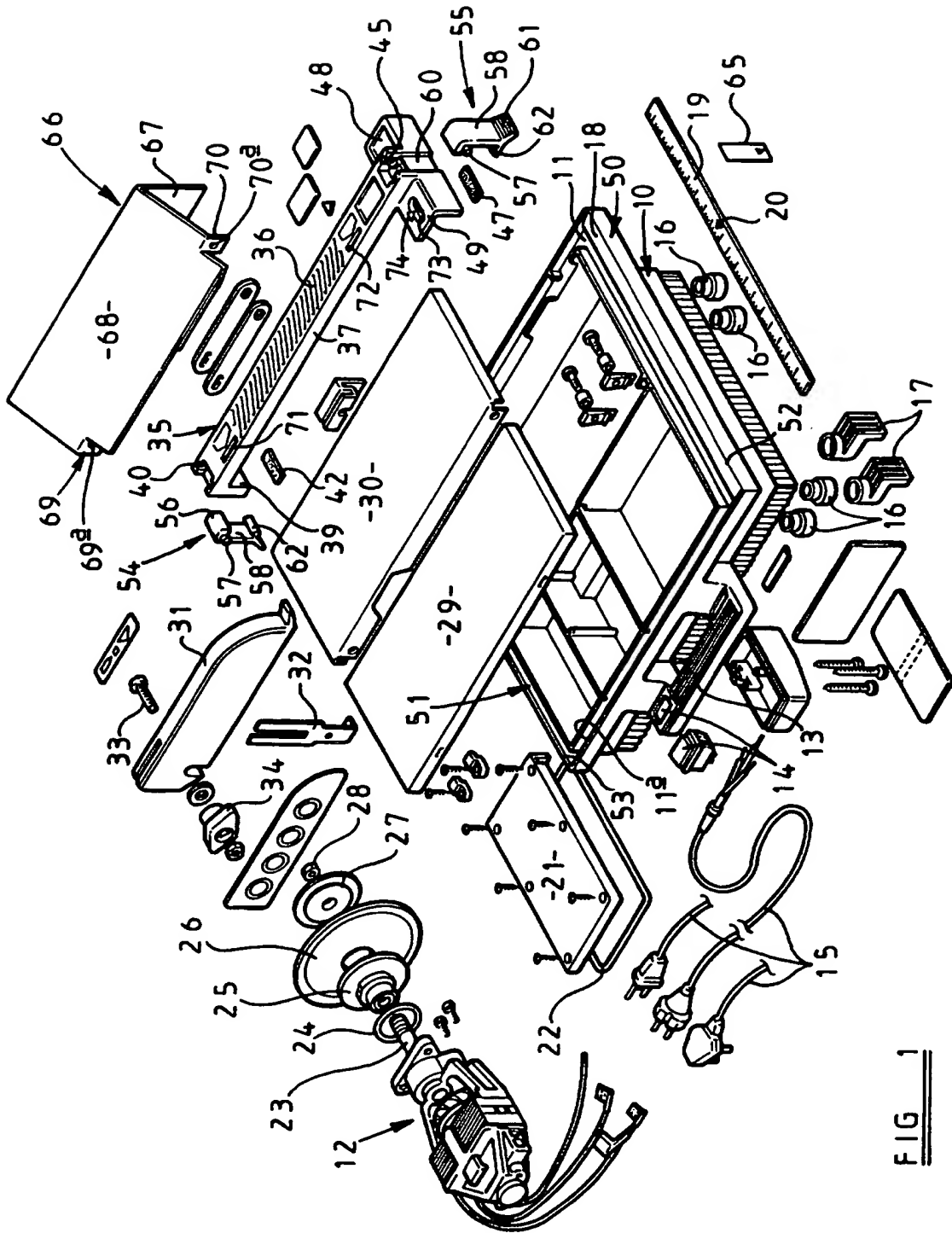
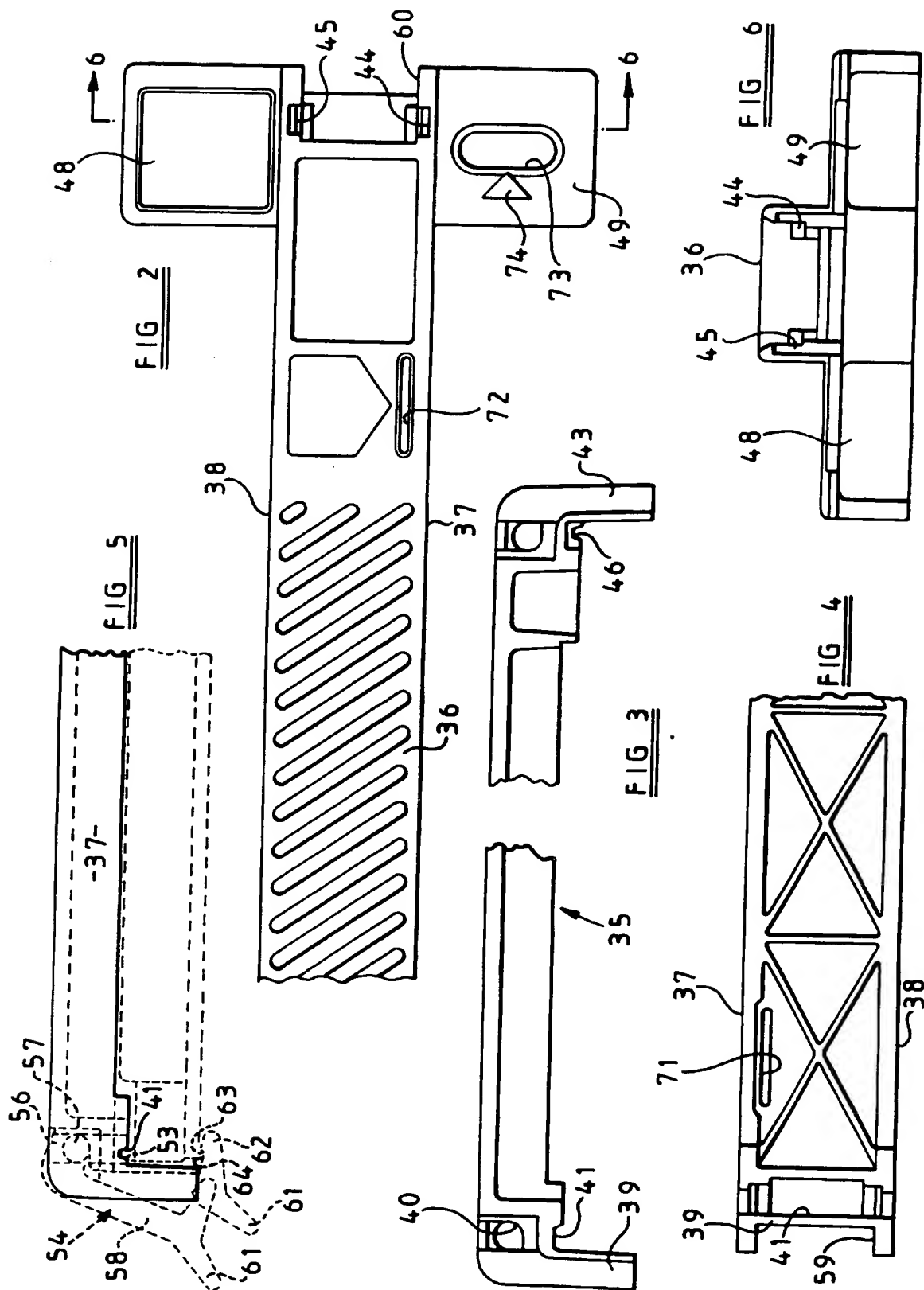


FIG 1



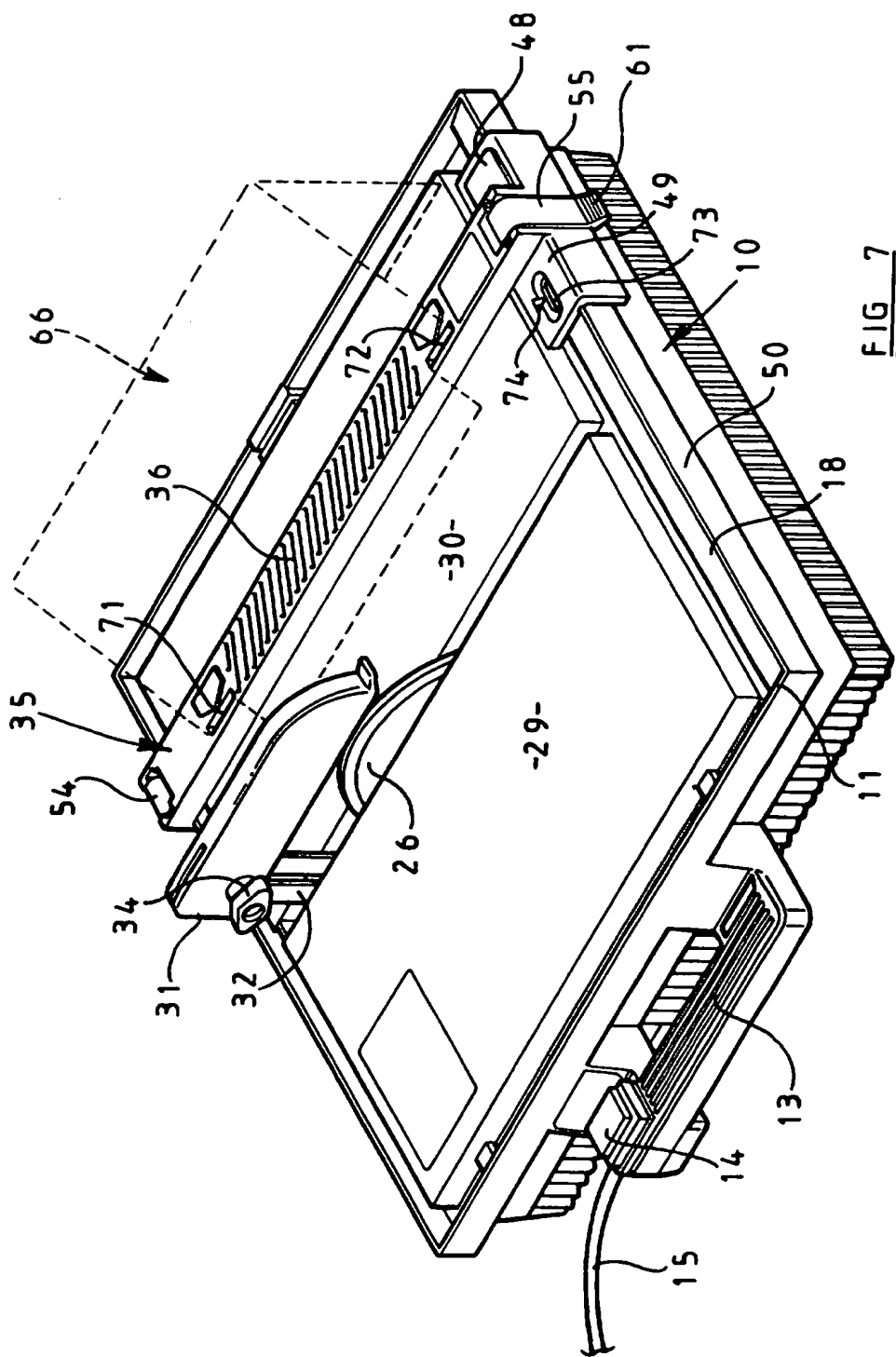


FIG. 7

CUTTING APPARATUS

This invention relates to cutting apparatus, particularly, though not exclusively, for cutting flat plates, such as ceramic tiles, and has as its object the provision of such apparatus in a convenient form.

According to a first aspect of the invention, cutting apparatus comprises a base, cutting means for cutting an article, particularly of plate-like form, received on said base and moved, in use, into engagement with said cutting means, and guide means against which part of said article can be located correctly to position the article on said base for said cutting thereof, the guide means being movable over the base to adjust the position thereof relative to the cutting means, and having quick engagement and release means associated therewith for the locking of the guide means in a selected adjusted position and the release therefrom for subsequent adjustment movement.

According to a second aspect of the invention, cutting apparatus comprises cutting means for cutting an article, particularly of plate-like form, moved into engagement with said cutting means, in use, said cutting means defining a plane of cut, and location means for the removable engagement of mitre guide means for receiving said article at an acute angle to said plane of cut, so that, in use, said article is cut by the cutting means at or substantially at said acute angle.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic, exploded perspective view of cutting apparatus of the invention;

Figure 2 is a fragmentary plan view of one end of a guide fence of the cutting apparatus;

Figure 3 is a broken centre line section along the guide fence, showing the ends thereof;

Figure 4 is a fragmentary underneath view of the other end of the guide fence;

Figure 5 is a fragmentary side view of the end of the guide fence shown in Figure 4, with said end being shown engaged with a body of the cutting apparatus by means of quick engagement and release means;

Figure 6 is a section on line 6-6 of Figure 2; and

Figure 7 is a view substantially as Figure 1, but with the apparatus in assembled form.

The embodiment of the cutting apparatus shown in Figure 1, is in the form of a tile cutter, i.e. for producing appropriate cuts both through and at the edges of conventional decorative ceramic tiles, which are normally in the form of flat, square plates. As well as providing means for producing a cut through the tile at 90° to the plane thereof, the apparatus also provides means for producing a mitre cut at an edge of the tile. As will be described, this embodiment of tile cutter is powered, the cut being produced by a motor driven cutter wheel.

As shown in Figure 1, the cutting apparatus comprises a main body moulding 10 of plastics material, this generally being in the form of a square, open-topped container which is correspondingly stepped on both its interior and exterior to provide an enlarged upper part 11. The moulding 10 is compartmentalised, particularly in its lower part, and in one of these compartments is received an electric motor and gear box unit 12. At one exterior side of the moulding 10, there is provided an integral handle 13 for transporting the tile cutter, in use, and this handle incorporates an on-off switch 14 for controlling the supply of power to the motor and gear box unit 12. Figure 1 shows three different forms of power cord and associated plug for supplying mains power by way of a switch 14, these different cord sets 15 being for U.K., Europe and America, respectively.

On the underside of the moulding 10, at the four corners thereof respectively, are provided feet 16. For two adjacent ones of these feet, there are provided respective edge stops 17, for example of plastics material, which clip over said rubber feet. These edge stops each have an inverted L-shaped extension to fit over the edge of a bench, table, worktop or the like to prevent the tile cutter moving away from said edge, in use.

Along one side of the upper part 10 there is provided a narrow flat ledge 18, and secured thereon is a gauge label 19 marked off with appropriate units of measurement. Moreover this is provided with indication means in the form of an arrowhead 20, for a purpose to be described hereinafter.

The motor and gear box unit 12 is fitted within the lower part of the moulding 10 in a conventional manner, an associated motor cover moulding 21 and motor housing gasket 22 being shown. A shaft 23 from the gear box of the unit 12, extends through an O-ring seal 24 and a blade carrier washer 25 to a diamond impregnated cutting wheel 26. The shaft, which is threaded at its free end, extends through the cutting wheel and through a final blade washer 27, with a blade nut 28 being tightly engaged with said screw thread to secure the parts of the cutting assembly together on the shaft so that the cutting wheel is driven from the motor and rotates with the shaft 23.

As previously mentioned, the main body moulding 10 has an upwardly open top. However this is closed by two substantially identical rectangular metal covers 29, 30 respectively which fit over a square rim provided at the top of the body moulding. When fitted in position, the upper surfaces of these metal covers respectively, constitute a generally continuous flat base onto which a tile can be placed, in use, for normal cutting at 90° to its plane. The cover 29 is fixed in position, whilst the cover 30 is removably disposed. The two covers do not meet along their adjacent common longitudinal sides, but are instead separated by a narrow gap into which the upper part of the diamond cutting wheel 26 projects, so that, in use, the cutting of a tile placed on the base formed by the covers 29, 30, takes place in the area of the gap between said covers as the tile is advanced into the cutting wheel.

The upper part of the cutting wheel which projects generally above the base formed by the covers 29, 30, is provided with an adjustable guard 31, which comprises a pair of side plates parallel to the plane of the cutter, connected together by an upper wall at right angles thereto. One

end of both these side plates and the upper wall are arcuately shaped to match the curvature of the cutting wheel. A blade-like member 32 projecting upwards from inside the moulding 10 is engageable by a guard clamp bolt 33 which passes through the guard and is lockingly engaged by a nut with a guard clamp knob 34 and the opposite sides thereof. The blade-like member 32 has a vertical slot therein, and this arrangement allows the guard 31 to be raised and lowered relative to the cutting wheel, as well as being pivoted about the bolt 33, once the clamp knob is unscrewed. Once the desired adjusted position of the guard is reached, the clamp knob can be tightened so as to securely hold the guard in its adjusted position. It will be appreciated that the guard 31 is aligned with the gap between the covers 29, 30.

Mounted on the moulding 10 for slidable movement across the part of the base formed by the upper surface of the cover 30, is a guide fence 35. This is a generally elongated member, which preferably is of plastics material. As can be seen from Figure 1, the guide fence 35 is of generally inverted straight channel shape between its ends having an upper surface 36 and opposite flat side surfaces 37, 38 respectively, extending downwardly at 90° to said upper surface. As will be appreciated, there is sufficient clearance to allow adjustable sliding movement of the guide fence over the base, between the respective lowermost edges of the side surfaces 37, 38 and the upper surface of the base.

As shown in the Figures, the left hand end of the guide fence 35, as viewed in Figure 1, is in the form of a downwardly depending leg 39. At the junction between the surfaces 36, 37, 38 and the upper part of this leg is formed a recess, in opposite facing side surfaces of which are

defined respective bearing surfaces, one of which 40 is shown in Figure 3. In the underside of the bottom wall of the recess is a groove 41. This extends from one of the side surfaces to the other and is broadest through its central portion, as can be seen from Figures 3 to 5. A rubber clamp pad 42 is fitted, in use, in said central part of the groove 41, for a purpose to be described.

The right hand end of the guide fence 35 has its central part of substantially the same form as with the left hand end, with a leg 43, and an upper recess providing respecting facing bearing surfaces 44, 45. Below the bottom surface of the recess is formed a cross-groove 46 of the same form as the groove 41, having an enlarged width central portion in which a rubber clamp pad 47 can be received.

The difference with this right hand end of the guide fence 35 is that at opposite sides of the central part described are two inverted L-shaped extensions 48, 49 respectively, the upper surface of each inverted L-shape lying parallel to the upper surface 36 but at a lower level, namely at the level of the lower edges of the side surfaces 37, 38. This arrangement is shown best in Figure 1 and also Figure 6 of the drawings. The groove 46 is continued through both of the extensions 48, 49 respectively.

The guide fence 35 is mounted on the moulding 10 so that it lies parallel to the side of the moulding at which the handle 13 is provided. The guide fence 35 thus lies perpendicular to a side 50 of the moulding at which the ledge 18 is provided. The opposite side of the moulding to the ledge 18 is denoted in Figure 1 by the numeral 51. The respective outer peripheries of these sides 50, 51 are formed with short upstanding

lips 52, 53 respectively and, in use, the guide fence 35 is mounted perpendicular to these sides 50, 51 with said lips 52, 53, being received against the clamp pads 42, 47 in the grooves 41, 46 formed at the opposite ends of said guide fence 35, thereby to locate the guide fence in position so that it extends across the part of the base of the cutting apparatus defined by the cover 30. Figure 5 shows the left hand end of the guide fence engaged on the surface of the cutting apparatus, which is shown in phantom, and it can be seen how this lip 53 is received in the groove 41.

At the other end of the guide fence 35, the lip 52 is received in groove 46 with clamp pad 47, and also in a continuation of the groove 46 through the extensions 48, 49 respectively. In this way the guide fence 35 is mounted so that it can be adjustably slidingly moved across the part of the base defined by the cover 30.

Quick release and engagement means are provided at the opposite ends of the guide fence 35 to enable this member to be quickly and easily locked in position, unlocked, adjustably moved and then locked in its adjusted position as required for different sizes and cuts of tiles. The means comprise a pair of plastics material guide fence clamps 54, 55 respectively. Each clamp has a generally square upper part 56 from the opposite sides of which extend cylindrical pegs 57. The pegs 57 fit in the respective bearing surfaces defined at each end of the guide fence 35, with the upper part 56 being received in the recess therebetween. The clamp 54 is shown in phantom in Figure 5 in two alternative positions, but in both cases it can be seen how the top part of the clamp engages as described in the bearing surfaces and the recess, the engagement being such as to allow the clamp to be pivotable. Extending

downwards from the upper part of the clamp is a central section 58 which in the locked position of the clamp is received within a vertical recess in the outer surface of the leg 39 or leg 43 respectively. These recesses are denoted by the numerals 59, 60 respectively in Figures 1, 2 and 4. Extending from the central section 58 at the bottom thereof, are two generally oppositely directed legs 61, 62 respectively. The outwardly extending leg 61 is essentially for gripping the clamp to pivot it between its locked and released positions shown in phantom in Figure 5. The inwardly extending leg has in its upper surface a cross-groove 63 to enable it to snap into engagement with a generally complementarily shaped downward rib 64 provided along the whole of the under surface of each of the peripheries of the sides 50, 51 previously mentioned. The flexibility of each guide fence clamp, particularly the central section thereof, enables each clamp to be pivoted by grasping its outwardly directed leg and moved between an unlocked position, shown in phantom at the extreme left hand side of Figure 5, to a locked position shown in the right hand position in phantom in Figure 5, where the inward leg engages with the rib 64 so as to cause tight engagement of the lips 52, 53 with the opposite ends of the guide fence so that it is firmly locked in position on the cover 30. When adjustment is required, the outward leg is grasped and the clamp merely pivoted to its release position. This releases the tight engagement between the guide fence and the body and allows the guide fence to be slid along the cover 30 to a selected adjusted position.

For the construction so far described, it is believed that the use of the tile cutter will be apparent. Namely a tile to be cut is placed on the base so that it straddles the gap between the covers 29 and 30, with one of its sides at right angles to the sides 50, 51 of the moulding being engaged

against the side 37 of the guide fence so that the desired cut through the tile will be made at the correct position. To assist in this positioning, use can be made of the scale provided by the gauge label 19. As mentioned, the guide fence can be slidably adjusted by use of the quick engagement and release means, so that when it is engaged by the tile the tile is in its correct position for the required cut.

With the power switched on, and the grinding wheel rotating, the tile is fed towards it, namely in a direction parallel to the length of the guide fence, and into engagement with the wheel, until the cut is complete. The lower part of the moulding contains water for cooling the cutting wheel, and a water level label 65 can be provided on the moulding to indicate when topping-up may be required. Debris from the cutting process is received in the water reservoir, eventually forming a slurry. The cover 30 is removable to enable such topping-up, or replacement by fresh water, to be effected, as well as enabling replacement or renewal of the cutting wheel should this be necessary. Prior to each cutting operation, the guard 31 can be adjusted as required. It is envisaged that tiles up to at least 300 mm square and 25 mm thick can be cut with this device. A typical motor would be one with a power rating of 400 Watts. During cutting, water can run off the tile being cut, and also off the covers 29,30, into a drain channel 11a moulded into the part 11 around its sides, from which channel such recovered water can return to the water reservoir. The arrangement of the compartments in the moulding 10 is particularly effectively designed for cooling of the motor.

As well as providing a cut at 90° through the plane of a tile, another aspect of the present invention relates to the ability of the tile cutter to provide a mitre cut. This is catered for by the provision of a mitre guide

66, shown in Figure 1. The mitre guide is formed of metallic sheet and is bent to provide a vertical rear wall 67 and a downwardly sloping, angled front wall 68 which provides a support surface for a tile to be cut, the wall 68 being of rectangular shape. However at its opposite lower corners, the wall is slit for a short way parallel to its shorter side so that a pair of tags 69, 70 can be bent rearwardly to lie parallel to the vertical rear wall 67. The tags have respective dimples 69a, 70a therein. The tags are sized and arranged to be received through respective rectangular openings 71, 72 which are provided in the upper surface 36 of the guide fence 35, these openings 71, 72 being aligned longitudinally of the guide fence 35, but being spaced apart to lie generally adjacent opposite ends of said guide fence. The dimples help to retain the tags in engagement after their passage through the openings. It will be appreciated that by a suitable repositioning of the openings 71, 72, a longer or shorter mitre guide can be used. It will be appreciated that means other than the tags 69, 70 could be used to secure the mitre guide to the guide fence, it merely being required that the mitre guide is accurately locatable so that, as will be described, when the guide fence is moved to an indicated correct position, a tile supported on the front wall 68 is correctly disposed for the mitre cut required at its lower edge. The wall 67 would normally be arranged to be supported by cover 30 to ensure the rigidity of the mitre guide, in use.

As shown in Figures 1 and 2, the extension 49 has a central opening 73 therethrough, and an arrowhead 74 at one side of the opening serves as one part of alignment means for correctly positioning the guide fence, when a mitre cut is to be carried out using a mitre guide attached to said guide fence. The other part of the alignment means is the arrowhead 20 on the scale provided by the gauge label 19. It will thus be appreciated

that, in use, for example when switching from using the tile cutter for through cuts, to using it for a mitre cut, the mitre guide is engaged with the guide fence, which is then unlocked by means of its guide fence clamps and slid to its desired position where the arrowhead 74 is aligned with the arrowhead 20. This predetermined position of the guide fence is such that the bottom of the front wall 68 is correctly positioned so that a tile edge surface at said position will, when the tile is fed towards the cutting wheel, be fed at such an angle that the correct mitre cut is produced. It would in fact be possible slightly to back-off the arrow head 74 from the arrow head 20 so that a slightly less sharp mitre cut is produced. However care must be taken so as not to move too much away from the fully aligned position of the arrowheads.

Whilst the tile cutter could merely be provided with a single mitre guide, for example to provide a 45° cut for the engagement of tiles at a 90° corner, it would be possible to provide a mitre guide for an angle other than 45°, or alternatively to provide a series of mitre guides each with a different angle of slope for the front wall 68, the angle between said front wall and the plane of the diamond wheel cutter providing the required acute angle of mitred cut. In this way the tile cutter can be seen to be versatile in allowing for both conventional forms of tile cutting as well as a variety of different mitre cuts, with the mitre cuts being made merely by quickly and easily engaging an appropriate mitre guide with the guide fence which, similarly, can be easily and quickly adjusted by means of the quick engagement and release clamps described. Of course, the apparatus could be provided without the mitre cut facility.

Instead of the specific structure of clamps and associated engaging parts of the guide means and the moulding disclosed, it will be appreciated

that other forms of quick release and engagement means could be provided to facilitate efficient and convenient adjustment movement of the guide fence. An example of such other means is over-centre lever locks.

Instead of a series of removable mitre guides, a single fixed mitre guide could be provided. Moreover with a single fixed mitre guide or with a series of removable mitre guides, the guide fence could be fixed relative to the cutting wheel, the apparatus providing mitre cuts only.

CLAIMS

1. Cutting apparatus comprising a base, cutting means for cutting an article, particularly of plate-like form, received on said base and moved, in use, into engagement with said cutting means, and guide means against which part of said article can be located correctly to position the article on said base for said cutting thereof, the guide means being movable over the base to adjust the position thereof relative to the cutting means, and having quick engagement and release means associated therewith for the locking of the guide means in a selected adjusted position and the release therefrom for subsequent adjustment movement.
2. Cutting apparatus as claimed in Claim 1, wherein the base has two parallel sides at which respective opposite ends of the guide means are releasably engagable by operation of said quick engagement and release means, at least part of the guide means between said opposite ends thereof defining a straight engagement surface against which it is intended said part of the article locates, in use.
3. Cutting apparatus as claimed in Claim 2, wherein respective downwardly depending leg means are defined at said opposite ends of the guide means, said parallel sides of the base having respective longitudinally extending lips along upper surfaces thereof respectively, the lips, in the locked position of the guide means, being received in respective grooves in the guide means immediately inwards of said leg means respectively.

4. Cutting apparatus as claimed in Claim 3, wherein in the locked position of the guide means the quick engagement and release means engage with respective undersurfaces of the parallel sides of the base.
5. Cutting apparatus as claimed in Claim 4, wherein the quick engagement and release means include respective manually operable locking members pivotally mounted on the guide means.
6. Cutting apparatus as claimed in Claim 5, wherein the locking members are pivotally mounted in respective recesses disposed immediately inwards of the respective leg means.
7. Cutting apparatus as claimed in Claim 5 or Claim 6, wherein there are snap-fit engagements between the locking members and the respective undersurfaces of the sides of the base, in the locked position of the guide means.
8. Cutting apparatus as claimed in Claim 7, wherein the locking members are of plastics material.
9. Cutting apparatus as claimed in any one of Claims 1 to 8, wherein the guide means is adapted releasably to carry mitre guide means for receiving said article, in use, at an acute angle to a plane of cut defined by said cutting means.
10. Cutting apparatus as claimed in Claim 9, wherein the guide means has indication means which, when the guide means is in a correctly located position relative to the cutting means for effecting a mitre cut, is aligned with indication means of the base.

11. Cutting apparatus comprising cutting means for cutting an article, particularly of plate-like form, moved into engagement with said cutting means, in use, said cutting means defining a plane of cut, and location means for the removable engagement of mitre guide means for receiving said article at an acute angle to said plane of cut, so that, in use, said article is cut by the cutting means at or substantially at said acute angle.
12. Cutting apparatus as claimed in Claim 11, wherein a number of mitre guide means providing different acute angles respectively to said plane of cut are selectively releasably engageable with said location means.
13. Cutting apparatus as claimed in Claim 11 or Claim 12, wherein the releasable engagement of the or each mitre guide means is by way of part of the mitre guide means being received in slot means of the location means.
14. Cutting apparatus as claimed in Claim 13, wherein the or each mitre guide means comprises a flat sheet having at least one tag angled out of the plane of the sheet for engagement in said slot means.
15. Cutting apparatus as claimed in Claim 14, wherein the flat sheet is provided with a rear support, which, in use, is parallel to said plane of cut and serves to hold the flat sheet rigid to receive said article.
16. Cutting apparatus as claimed in Claim 15, wherein the location means is provided by guide means adjustably slidable relative to said cutting means, the guide means having indication means which, when

the guide means is in a correctly located position relative to the cutting means for effecting a mitre cut, is aligned with indication means fixed relative to the position of the cutting means.

17. Cutting apparatus as claimed in Claim 16, comprising a base over which the guide means is linearly slidably adjustable, the guide means having a flat location surface against which part of the article to be cut in said plane of cut can be engaged, so as correctly to position the article on said base for said cutting as relative engagement movement between the article and the cutting means occurs, in use.

18. Cutting apparatus as claimed in any one of Claims 11 to 15, comprising a base over which guide means defining the location means is adjustably slidable relative to the cutting means, the guide means having a flat location surface against which part of the article to be cut in said plane of cut can be engaged, so as correctly to position the article on said base for said cutting as relative engagement movement between the article and the cutting means occurs, in use.

19. Cutting apparatus comprising a base, cutting means for cutting an article, particularly of plate-like form, received on said base and moved, in use, into engagement with said cutting means, and guide means against which part of said article can be located correctly to position the article on said base for said cutting thereof, the guide means being movable over the base to adjust the position thereof relative to the cutting means, and mitre guide means carried by said movable guide means, for receiving said article at an acute angle to said plane of cut, so that, in use, said article is cut by the cutting means at or substantially at said acute angle.

20. Cutting apparatus as claimed in claim 19, wherein the mitre guide means is fixed to said movable guide means.

21. Cutting apparatus substantially as hereinbefore described, with reference to, and as shown in, the accompanying drawings.



Application No: GB 9615465.3
Claims searched: 1-8,21

Examiner: Dave Butters
Date of search: 11 October 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B5L, B3D

Int Cl (Ed.6): B27B, B24B

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2142275 A (BLACK & DECKER)	1,2
X	GB 0692317 A (KEARNY & TRECKER)	1,2
X	US 5293802 A (RYOBI)(See Figs 28-40)	1,2
X	US 4206910 A (BIESEMEYER)	1

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.